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(1), which had a negative deviation for all concentrations. The relation between total vapor pressure of binary systems and temperature follows the Henglein equation. The relation of the partial pressure of the components of the system and the composition of the system follows those of the Bancroft equation.

"Isomerization of the Dimethyl Ether of 1,4-Dihydro- $\alpha$ -Naphthohydroquinone," A. P. Terent'yev, P. P. Shavolova, Lab Org Chem, Moscow Order of Lenin State U imeni M. V. Lomonosov

"Zhur Obshch Khimii" Vol 15, 1945, pp 142-5

It was shown that the di-Me ether of 1,4-dihydro- $\alpha$ -naphthohydroquinone (5,8-dihydro-1,4-naphthalenediol) when heated with NaOMe isomerizes into the corresponding 1,2-dihydro derivative. The initial 1,4-dihydro- $\alpha$ -naphthoquinone was prepared by condensation of butadiene with quinone and the product treated with HBr in AcOH gave 5,8-dihydroxy-1,4-dihydro-naphthalene, m. 212°, which, treated with Me<sub>2</sub>SO<sub>4</sub> in 20% NaOH, gave the di-Me ether (I) of 1,4-dihydro- $\alpha$ -naphthohydroquinone m 50°, 298-300°. The ether heated with 10% MeONa in MeOH to 130° for 6 hours in a sealed tube isomerized quantitatively into the di-Me ether (II) of 1,2-dihydro- $\alpha$ -naphthohydroquinone, m 54°. I yields a crystalline dibromide (2,3-dibromo-1,2,3,4-tetrahydro-5,8-dimethoxynaphthalene), m 124°; II fails to yield a stable dibromide. Heating of either ether with S at 250° yielded the mono-Me ether of naphthohydroquinone, m 84-5°. II shows an MR exaltation of 2.34; I has a normal MR. Reduction of II in KOH by means of Na gave the Me ether of tetrahydronaphthohydroquinone, m 39-40°; I failed to reduce under these conditions. II copolymerizes readily with butadiene (Na catalyst); I does so very slowly.

"The Chemical Nature of Volutin," A. N. Belozerskiy, Lab Plant Biochem, Moscow Order of Lenin State U imeni M. V. Lomonosov

"Mikrobiologiya" Vol 14, No 1, 1945, pp 29-34

A protein-free substance was extracted from 2-4-day cultures of *Spirillum volutans*, in amounts of 8-12% of dry weight, which proved to be a nucleic acid of the yeast type. It was named "volutin-nucleic acid" (I). Six-day cultures did not contain I. A 0.2% solution of Na<sub>2</sub>CO<sub>3</sub> was used for extraction of the bacterial mass. Since rapid neutralization occurred, a 10% soda solution was added drop-by-drop until a stable alkaline reaction was reached. Acidification with AcOH precipitated nucleoproteins and treatment of the filtrate with alcohol and HCl yielded I. Hydrolysis of I gave all the purine and pyrimidine bases characteristic for yeast-nucleic acid (II). Analysis of I gave:

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total N 9, P 10, S 0.9, and pentoses 24% of dry weight. Thus, I contains considerably more P than II, and it is a high-molecular weight  $H_2SO_4$  ester. Volutin (metachromatin) (III) is a stored product and not a component of nucleus or cytoplasm, since the cell maintains its activity in the absence of III.

"Antithyroid Activity of 4-Methyl-2-Thiouracil,"  
Ya. M. Kabak, A. A. Beer, A. E. Rabkina, Moscow  
Order of Lenin State University M. V. Lomonosov

"Byul Eks Biol i Med" Vol 21, 1946, pp 37-40

No mortalities were observed when 4-methyl-2-thiouracil was administered to rats in dosage under 60 mg per day. The effects of prolonged treatment included slowing of growth and of heart action. Characteristic thyroidectomy cells became evident. Implantation of the gland, after such treatment, into tadpoles failed to induce metamorphosis in the latter.

"Kinetic Analysis of the Electrochemical  
Methane to Acetylene and Hydrogen," S. S. Vasil'yev,  
Moscow Order of Lenin State University M. V. Lomonosov

"Zhur Fiz Khimii" Vol 20, 1946, pp 517-38

Literature data on transformation of  $CH_4$  into  $C_2H_2$  and  $H_2$  in an electrical discharge are collected and supplemented by some unpublished observations. A theory of the process is derived. It is based partly on the mass law, and partly on some empirical rules. It gives the connection between the yield of  $C_2H_2$  and the electric properties of the discharge, the dimensions of the reaction vessel, the rate of gas flow, and the gas composition. Observes an agreement between experiment and theory.

"An Automatic Apparatus for the Production of Distilled Water," P. P. Pugachevich, Moscow Order of Lenin State University M. V. Lomonosov, Sci Res Inst of Phys

"Zavod Lab" Vol 12, 1946, pp 762

No details given.

"The Normal Tungstates of Rubidium and of Cesium,"  
V. I. Spitsyn, Moscow Order of Lenin State University  
M. V. Lomonosov

"Zhur Obshch Khimii," Vol 17, 1947, pp 11-22

Attempts to prepare the simple tungstates by fusion of  $WO_3$  with the alkali metal carbonates failed to give pure products, owing to thermal dissociation and volatility. Synthesis by way of a

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double exchange of the sulfates or carbonates with  $\text{BeWO}_4$  also was unsuccessful, owing to reversibility of the reaction. Most successful was the double exchange of the chlorides with  $\text{Ag}_2\text{WO}_4$  (prepared by precipitation of  $\text{AgNO}_3$  with  $\text{Na}_2\text{WO}_4$  and drying the washed precipitate at 100-110°), preferably by fusion at 400-500° with a 20-25% excess of  $\text{Ag}_2\text{WO}_4$ . The product is kept in the dark over  $\text{P}_2\text{O}_5$  and alkali, crushed rapidly and twice leached with water (each time 50 ml per 5 g initial chloride) under exclusion of  $\text{CO}_2$ ; the first leaching is done in the cold, 10-12 hours; the second at boiling 10-15 minutes. The yield is 90-92% of the theory, the losses occurring by absorption of part of the solution by the  $\text{AgCl}$  precipitate. Analysis confirmed the simple formulas  $\text{Kb}_2\text{WO}_4$  and  $\text{Cs}_2\text{WO}_4$ .

"Determination of Active Hydrogen by Grignard Reagents in a Carbon Dioxide Atmosphere, IV," A. P. Terent'yev, K. D. Shcherbakova, N. V. Kremenskaya, Moscow Order of Lenin State U ineni M. V. Lomonosov

"Zhur Obshch Khimii" Vol 17, 1947, pp 100-4

The use of  $\text{MeMgBr}$  and  $\text{MeMgCl}$ , in place of the usual  $\text{MeMgI}$ , in the active H determination in  $\text{CO}_2$  atmosphere as described previously was investigated.  $\text{MeMgBr}$  is suitable on the basis of trials with the following substances:  $\text{BuOH}$ , borneol, pyrocatechol,  $\text{MeEtC(OH)Ph}$ ,  $\text{Ph}_2\text{C(OH)Et}$ ,  $\text{PhCH(OH)Et}$ ,  $\text{EtOH}$ ,  $\text{o-AcOCC}_6\text{H}_4\text{CO}_2\text{H}$ , mandelic acid, citraconic acid,  $\text{PhNH}_2$ ,  $\text{p-MeC}_6\text{H}_4\text{NH}_2$ , 1-(1-piperidyl)-3-aminopropane,  $\text{HCCHPh}$ , and 2-acetylpyrrole. The deviations noted were:  $\text{EtPhCH(OH)}$  gave 1.11 and  $\text{EtPh}_2\text{COH}$  1.25 H atoms, evidently because of the dehydrating action of the reagent. Primary amines gave figures slightly lower than theoretical ( $\text{PhNH}_2$  1.94, 1-(1-piperidyl)-3-aminopropane 1.8 H) due to interaction of  $\text{CO}_2$  with the primary reaction product, so that the second stage does not go quite to completion for the less soluble bromides, while the soluble iodides are able to go to completion.  $\text{MeMgCl}$  gave consistently good results with: 1- and 2-naphthols, salicylic acid, borneol, and p-nitrophenol. Hydroquinone, because of poor solubility, gave low results (1.56-1.63).  $2\text{-C}_6\text{H}_4\text{NH}_2$  gave 0.99 H at  $\text{Et}_2\text{O}$  reflux, and 1.98 H at 100°. Benzidine gave 2.0 H at low and high (100°) temperatures.  $\text{AcC}_6\text{H}_4\text{CO}_2\text{Et}$  gave 1.01 H. When the reaction was run in  $\text{C}_6\text{H}_6$ , thymol gave 1.03 H, salicylic acid 2.0, and  $\text{Ph}_2\text{NH}$  1.0 H. Generally,  $\text{MeMgCl}$  was less active than the Br compound and tended to lose its titer more rapidly than the latter on standing.

"Syntheses With Acrylonitrile: IV, Reduction of Nitriles With Sodium in Alcohol Medium," A. N. Kost, A. P. Terent'yev, Moscow Order of Lenin State U ineni M. V. Lomonosov

"Zhur Obshch Khimii" Vol 17, 1947, pp 105-8

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In unpublished work of Longinov and Filippov, 1935, it was found that when the Na used for the reduction of esters contains even as little as 0.01% of K the yields of the alcohols drop rapidly. In the reduction of  $\text{BuCh}(\text{CO}_2\text{Et})_2$  the yield is zero when the Na contains 0.01% K. However, if the amount of K is increased, the yields rise again and become normal with 2% K. This is important since Na is usually contaminated with traces of K. This study was extended to the reduction of  $\text{Et}_2\text{NCH}_2\text{CH}_2\text{CN}$  and 1-piperidinepropionitrile in  $\text{BuOH}$  by the Suter and Moffet method. Technical Na gave 38-50% of the diamine, pure Na 51-63%, while technical Na with the addition of 2% K gave 65.9-74% diamine, in the case of  $\text{Et}_2\text{NCH}_2\text{CH}_2\text{CN}$ . With the piperidyl compound the yields were 42-46%, 48.9-57.2%, and 48-57%, respectively, thus indicating a similarity to the results obtained in ester reduction. The high-K Na gave reproducible yields and tended to give smaller amounts of higher-boiling products (presumably secondary amines). The Rupe technique (immediate steam distillation) gave similar results, but was inconvenient due to the low volatility of the products.

"Catalytic Transformations of Heterocyclic Compounds: XII. Transformation of Furan and Furanidine Into Hydrocarbons," Yu. K. Yur'yev, V. A. Tronova, M. Ya. Kuznetsova, E. G. Novosadova, Moscow Order of Lenin State U ineni M. V. Lomonosov

"Zhur Obshch Khimii" Vol 17, 1947, pp 131-6

Furanidine (5-6 g) was passed over  $\text{Al}_2\text{O}_3$  in a strong current of  $\text{C}_2\text{H}_2$  at  $375^\circ$ ; the catalyst slowly became covered with a brown deposit and had to be regenerated occasionally by air-blowing. The catalyst temperature rose initially up to  $405-430^\circ$ , becoming stabilized generally at about  $385^\circ$ . The yield of products was 1.5-1.95 g. The combined products from 10 runs were dried over  $\text{CaCl}_2$  and fractionated. A fraction (0.75g), b  $78-84^\circ$ ,  $n_D^{20}$  1.4701, contained cyclohexadiene, formed evidently by bond redistribution of the initially formed cyclohexyne. A fraction (1.1 g), b  $100-200^\circ$ ,  $n_D^{20}$  1.4740, appeared to be a product of  $\text{C}_2\text{H}_2$  condensation over  $\text{Al}_2\text{O}_3$ , admixed with methylcyclohexadiene (from propylene and  $\text{C}_2\text{H}_2$ ). Furan (5 g) was passed over activated C in 1.25 hours in a H stream at  $375-500^\circ$ ; the best yield (16%) of butadiene was obtained at  $425^\circ$ ; when Cu(5%) on activated C was used at  $200-450^\circ$ , the best yield of butadiene (20.1%) was obtained at  $425^\circ$  when 5 g furan was passed through the catalyst in 1.6 hours. Results are interpreted as favoring the possibility of petroleum formation from carbohydrate matter in nature.

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"Surface Tension of Solutions of Molten Salts, II," V. K. Semenchenko, L. P. Shikhobalova, Moscow Order of Lenin State U imeni M. V. Lomonosov

"Zhur Fiz Khimii" Vol 21, 1947, pp 707-14

Surface tension of five binary melts was determined by the method of the maximum bubble pressure. The  $\sigma$  of unmixed salts at 900° and 1,000° respectively are:  $\text{Li}_2\text{SO}_4$  224 and 211 dynes/cm,  $\text{NaCl}$  109 and 95,  $\text{KCl}$  91 and 75,  $\text{RbCl}$  83 and 66,  $\text{CsCl}$  72 and 59 (at 1,050°), and  $\text{BaSO}_4$  175 (1,000°) and 172 (1,050°).  $\text{K}_2\text{SO}_4$  at 1,075° has  $\sigma = 144.3$ . The error is  $\pm 1$  dyne/cm. The  $\sigma$  of  $\text{Li}_2\text{SO}_4$  is lowered by the above chlorides, more so the smaller the  $\sigma$  of the chloride. At about 1-5 molecular % of the chloride  $\sigma$  is independent of its concentration; otherwise, the curve of  $\sigma$  against mole fraction is regular and slightly convex toward the origin of the coordinates. The curve for  $\text{Li}_2\text{SO}_4 + \text{BaCl}_2$  has a minimum (165 at 1,000°) at the equimolecular composition. For all melts, the curve of  $\sigma$  against temperature is slightly concave toward the origin of the coordinates. The value of  $\sigma$  is determined by the "generalized moment" of the ion, i.e., its charge divided by its crystallographic radius. The greater the difference between the "generalized moments" of the ions of solvent and solute, the greater the surface activity.

"Relation Between the Viscosity of Liquids and Their Pressure," G. M. Panchenkov, Moscow Order of Lenin State U imeni M. V. Lomonosov

"CR Acad Sci URSS" Vol 51, 1946, pp 365-8

The following relation between viscosity and temperature for liquids had previously been developed:

$$\eta = \sqrt{6R} \sqrt{\omega^2/N_0} (\rho^4/M^4) \sqrt{T} e^{\epsilon/RT(1-e^{-\epsilon/RT})^2}$$

when  $\eta$  is the viscosity coefficient,  $R$  the gas constant,  $N_0$  the Avogadro number,  $\omega$  the actual molecular volume,  $\rho$  the density of the liquid,  $M$  the molecular weight,  $T$  the absolute temperature, and  $\epsilon$  the bond energy of the molecules. Since both  $\epsilon$  and  $\rho$  are functions of pressure, the above formula indicated a means to calculate  $\eta$  as a function of pressure. Calculated values of  $\eta$  for  $\text{EtOH}$  and  $\text{EtBr}$  indicated fair agreement with experimental data over a range from 1 to 12,000 atmospheres.

"Appearance of Free Atomic Hydrogen on the Mercury Cathode and the Mechanism of the Cathodic Reduction of Tungstate," V. S. Bagotskiy, S. A. Iofa, Moscow Order of Lenin State U imeni M. V. Lomonosov

"CR Acad Sci URSS" Vol 53, 1946, pp 439-42

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aggravation, and for the fact that in certain atoms and atomic ensembles (inorganic catalysts) this property is practically absent.

"Surface Reactions. III. Reaction Between Solutions of Hydrolyzed Salts and Ash-Free Active Carbons," L. Lepin, G. Strakhova Moscow Order of Lenin State University M. V. Lomonosov

"Acta Physicochimica URSS" Vol 21, 1946, pp 1089-1104  
 "Zhur Fiz Khimii" Vol 20, 1946, pp 743-52

Adsorption of  $\text{Cl}^-$  from solutions of  $\text{AlCl}_3$ ,  $\text{CuCl}_2$ ,  $\text{FeCl}_2$ , and  $\text{PbCl}_2$  by ash-free carbon is greater than from solutions of  $\text{KCl}$  or  $\text{BaCl}_2$ . Addition of  $\text{HCl}$  increases the adsorption of  $\text{Cl}^-$  from  $\text{KCl}$ ,  $\text{BaCl}_2$ , or  $\text{AlCl}_3$  solutions because  $\text{H}^+$  neutralizes the  $\text{OH}^-$  ions leaving the carbon. Addition of  $\text{HCl}$  lowers the adsorption of  $\text{Cl}^-$  from  $\text{CuCl}_2$ ,  $\text{FeCl}_2$ , and  $\text{PbCl}_2$  solutions because of the formation of  $[\text{CuCl}_4]^{2-}$  and similar ions. In solutions of  $\text{CuCl}_2$ ,  $\text{FeCl}_2$ , and  $\text{PbCl}_2$  carbon gives rise to precipitates.

"Sulfonation of Furan Derivatives," A. P. Terent'yev, L. A. Karitsyna, Moscow Order of Lenin State University M. V. Lomonosov

"CR Acad Sci URSS" Vol 55, 1947, pp 625-8

Silvan (I), 2,5-dimethylfuran (II), coumarone (III), and thiophene (IV) were sulfonated with  $\text{C}_5\text{H}_5\text{N-SO}_3$  in 1:3 molar ratio at 100-100° 8-10 hours in a sealed tube. I gave 80% 2-methyl-3,5-furandisulfonic acid (V), isolated as the Ba and Na salts. Pure V was not obtained since it is very hygroscopic. II gave 2,5-dimethyl-3-furansulfonic acid as the Ba salt. III gave in quantitative yield 2-coumaronesulfonic acid, isolated as the Ba and Ag salts. IV gave a disulfonic acid, the constitution of which has not yet been established.  $\text{C}_6\text{H}_6$ ,  $\text{MePh}$ , and 1,3,5- $\text{Me}_3\text{C}_6\text{H}_3$  were not sulfonated by  $\text{C}_5\text{H}_5\text{N-SO}_3$  whereas  $\text{PhOMe}$  gave a quantitative yield of a monosulfonic acid.

"Sulfonation of Indole and Its Homologs," A. P. Terent'yev, L. V. Tsybal, Moscow Order of Lenin State University M. V. Lomonosov

"CR Acad Sci URSS" Vol 55, 1947, pp 833-5

The Ba salt of 1-indolesulfonic acid (I) was prepared by shaking a finely divided aqueous suspension of 1 g indole (II) with 8 g  $\text{Ba(OH)}_2$  and 4 g  $\text{C}_5\text{H}_5\text{N-SO}_3$  in an ice bath 1.5 hours. The excess  $\text{Ba(OH)}_2$  was precipitated with  $\text{CO}_2$  and removed by filtration. The filtrate was concentrated to a small volume in the constant presence of  $\text{NH}_3$  and 1 g. I was precipitated with excess  $\text{EtOH}$ . Its constitution was proven by analysis and the hydrolysis of I to II. The yield of the Ba salt of 2-indolesulfonic acid was improved to practically quantitative by sulfonation of II with a 2- or 3-molar excess of  $\text{C}_5\text{H}_5\text{N-SO}_3$  at 120-40° (sealed tube).

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The electron conductivity of  $WO_3$  is considered as the mechanism for the cathodic reduction of the yellow anhydride  $WO_3$  to the blue  $W_2O_5$  in electrolytic solutions. The theory that free atomic H in solution near the cathode acts as an intermediate agent in the reduction process is excluded. Simple experiments are described which support the electron conductivity theory and are explained without any assumption as to the appearance of free H in solutions near the cathode.

"Active Charcoals and Adsorption From Solutions," O. M. Dzhigit, M. M. Dubinin, A. V. Kiselev, K. D. Shcherbakova, Moscow Order of Lenin State U imeni M. V. Lomonosov

"CR Acad Sci URSS" Vol 54, 1946, pp 141-4

The adsorption of mainly butyl and heptyl alcohols from water solutions by means of six different charcoals ranging widely in pore size was investigated to show the effect of the pore structure on the limit adsorption of alcohols of limited solubility in water. The charcoal structure was shown to have a strong effect on the shape of the adsorption isotherms and on the values of limit adsorption. The rule of constant adsorbed limit volumes was approximately true for each of the carbons studied for the four alcohols butyl to heptyl. The micropores of the charcoals are equally accessible to the different alcohols and are densely filled by the alcohol molecules at limit adsorption.

"The Ensemble and Aggravation Principles in Catalysis: II. The Aggravation Principle and Structural Classification of Catalysts," N. I. Kobozov, Moscow Order of Lenin State U imeni M. V. Lomonosov

"Acta Physicochimica URSS" Vol 21, 1946, pp 943-57

Catalysts are classified as to degree of complexity of the structure of active center. The smallest cluster of atoms still possessing catalytic properties is termed the "active element" and is denoted by  $\bar{A}$ .  $\bar{A}$  frequently coincides with some chemical element. Two principal types exist involving aggravation of  $\bar{A}$  and its association. Aggravation of active element-formation of active aggravate. This involves attachment of any molecular groups that are catalytically nonspecific, thus increasing the molecular weight of the catalyst, molecular potential, number of degrees freedom, number of bonds, and total energy. Examples given. A structural classification of catalysts, covering all known types of active structures, is developed. The carriers are considered not only as fixation agents but also as aggravators of active elements (agons, protogens). This conception underlies the treatment of enzymes as highly aggravated structures, settling many contradictions in Willstatter's scheme. An explanation is suggested for the particular propensity of ions and large molecules to adsorptional

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Its constitution was proven by showing that sulfonation takes place in skatole but not in 2-methylindole. The preparation of  $C_5H_7N-SO_3$  is described.

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